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NOV 27 2019

Federal Communications Commission
Office of the Secretary

November 27, 2019

Womble Bond Dickinson (US) LLP

1200 Nineteenth Street, NW
Suite 500
Washington, DC 20036

t: 202.467.6900
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Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
455 12th Street, S.W.
Washington, D.C. 20554

John F. Garziglia
Partner
Direct Dial: 202-857-4455
Direct Fax: 202-261-0055
E-mail:John.Garziglia@wbd-us.com

Re: **FCC 302-AM Application – WRHL(AM), Rochelle, IL**
(FCC Facility ID # 57268)

Dear Ms. Dortch:

Submitted herewith in triplicate on behalf of Rochelle Broadcasting Company, Inc., the licensee of WRHL(AM), Rochelle, IL is an FCC Form 302-AM application submitting a proof of performance to comply with the special operating condition in the W228DT, Rochelle, IL construction permit (FCC File No. BNPFT-20171205AAU).

Should any questions arise, please contact the undersigned.

Respectfully submitted,

John F. Garziglia

BM-214123ABL
600-723595

Enclosures

Federal Communications Commission
Washington, D. C. 20554

Approved by OMB
3060-0627
Expires 01/31/98

FOR FCC USE ONLY

FCC 302-AM
APPLICATION FOR AM BROADCAST STATION LICENSE

(Please read instructions before filling out form.)

FOR COMMISSION USE ONLY
FILE NO. BL-20191127AAW

SECTION I - APPLICANT FEE INFORMATION

1. PAYOR NAME (Last, First, Middle Initial)

Rochelle Broadcasting Company, Inc.

MAILING ADDRESS (Line 1) (Maximum 35 characters)
PO Box 177

MAILING ADDRESS (Line 2) (Maximum 35 characters)

CITY	STATE OR COUNTRY (if foreign address)	ZIP CODE
Rochelle	IL	61068

TELEPHONE NUMBER (include area code)	CALL LETTERS	OTHER FCC IDENTIFIER (If applicable)
(815) 562-7001	WRHL	FCC ID 57268

2. A. Is a fee submitted with this application? ☐ Yes ☑ No

B. If No, indicate reason for fee exemption (see 47 C.F.R. Section

☐ Governmental Entity ☐ Noncommercial educational licensee ☐ Other (Please explain):

C. If Yes, provide the following information: Non-feeable Application

Enter in Column (A) the correct Fee Type Code for the service you are applying for. Fee Type Codes may be found in the "Mass Media Services Fee Filing Guide." Column (B) lists the Fee Multiple applicable for this application. Enter fee amount due in Column (C).

(A) FEE TYPE CODE	(B) FEE MULTIPLE	(C) FEE DUE FOR FEE TYPE CODE IN COLUMN (A)	FOR FCC USE ONLY
	0 0 0		

To be used only when you are requesting concurrent actions which result in a requirement to list more than one Fee Type Code.

(A)	(B)	(C)	FOR FCC USE ONLY
	0 0 0		

ADD ALL AMOUNTS SHOWN IN COLUMN C, AND ENTER THE TOTAL HERE. THIS AMOUNT SHOULD EQUAL YOUR ENCLOSED REMITTANCE.	TOTAL AMOUNT REMITTED WITH THIS APPLICATION	FOR FCC USE ONLY

SECTION II - APPLICANT INFORMATION		
1. NAME OF APPLICANT Rochelle Broadcasting Company, Inc.		
MAILING ADDRESS PO Box 177		
CITY Rochelle Broadcasting Company, Inc.	STATE IL	ZIP CODE 61068

2. This application is for:

☑ Commercial ☐ Noncommercial

☑ AM Directional ☐ AM Non-Directional

Call letters	Community of License	Construction Permit File No.	Modification of Construction Permit File No(s).	Expiration Date of Last Construction Permit
WRHL	Rochelle, IL	n/a	n/a	n/a

3. Is the station now operating pursuant to automatic program test authority in accordance with 47 C.F.R. Section 73.1620?

☐ Yes ☐ No

If No, explain in an Exhibit.

Exhibit No. n/a

4. Have all the terms, conditions, and obligations set forth in the above described construction permit been fully met?

☐ Yes ☐ No

If No, state exceptions in an Exhibit.

Exhibit No. n/a

5. Apart from the changes already reported, has any cause or circumstance arisen since the grant of the underlying construction permit which would result in any statement or representation contained in the construction permit application to be now incorrect?

☐ Yes ☐ No

If Yes, explain in an Exhibit.

Exhibit No. n/a

6. Has the permittee filed its Ownership Report (FCC Form 323) or ownership certification in accordance with 47 C.F.R. Section 73.3615(b)?

☐ Yes ☐ No

☑ Does not apply

If No, explain in an Exhibit.

Exhibit No.

7. Has an adverse finding been made or an adverse final action been taken by any court or administrative body with respect to the applicant or parties to the application in a civil or criminal proceeding, brought under the provisions of any law relating to the following: any felony; mass media related antitrust or unfair competition; fraudulent statements to another governmental unit; or discrimination?

☐ Yes ☑ No

If the answer is Yes, attach as an Exhibit a full disclosure of the persons and matters involved, including an identification of the court or administrative body and the proceeding (by dates and file numbers), and the disposition of the litigation. Where the requisite information has been earlier disclosed in connection with another application or as required by 47 U.S.C. Section 1.65(c), the applicant need only provide: (i) an identification of that previous submission by reference to the file number in the case of an application, the call letters of the station regarding which the application or Section 1.65 information was filed, and the date of filing; and (ii) the disposition of the previously reported matter.

Exhibit No.

8. Does the applicant, or any party to the application, have a petition on file to migrate to the expanded band (1605-1705 kHz) or a permit or license either in the existing band or expanded band that is held in combination (pursuant to the 5 year holding period allowed) with the AM facility proposed to be modified herein?

☐ Yes ☑ No

If Yes, provide particulars as an Exhibit.

Exhibit No. n/a

The APPLICANT hereby waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because use of the same, whether by license or otherwise, and requests and authorization in accordance with this application. (See Section 304 of the Communications Act of 1934, as amended).

The APPLICANT acknowledges that all the statements made in this application and attached exhibits are considered material representations and that all the exhibits are a material part hereof and are incorporated herein as set out in full in

CERTIFICATION

1. By checking Yes, the applicant certifies, that, in the case of an individual applicant, he or she is not subject to a denial of federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. Section 862, or, in the case of a non-individual applicant (e.g., corporation, partnership or other unincorporated association), no party to the application is subject to a denial of federal benefits that includes FCC benefits pursuant to that section. For the definition of a "party" for these purposes, see 47 C.F.R. Section 1.2002(b).

☑ Yes ☐ No

2. I certify that the statements in this application are true, complete, and correct to the best of my knowledge and belief, and are made in good faith.

Name	Signature	
Gary Petersen		
Title President ~~Secretary and Treasurer~~	Date 11/25/2019	Telephone Number (815) 562-7001

WILLFUL FALSE STATEMENTS ON THIS FORM ARE PUNISHABLE BY FINE AND/OR IMPRISONMENT (U.S. CODE, TITLE 18, SECTION 1001), AND/OR REVOCATION OF ANY STATION LICENSE OR CONSTRUCTION

FCC NOTICE TO INDIVIDUALS REQUIRED BY THE PRIVACY ACT AND THE PAPERWORK REDUCTION ACT

The solicitation of personal information requested in this application is authorized by the Communications Act of 1934, as amended. The Commission will use the information provided in this form to determine whether grant of the application is in the public interest. In reaching that determination, or for law enforcement purposes, it may become necessary to refer personal information contained in this form to another government agency. In addition, all information provided in this form will be available for public inspection. If information requested on the form is not provided, the application may be returned without action having been taken upon it or its processing may be delayed while a request is made to provide the missing information. Your response is required to obtain the requested authorization.

Public reporting burden for this collection of information is estimated to average 639 hours and 53 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, can be sent to the Federal Communications Commission, Records Management Branch, Paperwork Reduction Project (3060-0627), Washington, D.C. 20554. Do NOT send completed forms to this address.

THE FOREGOING NOTICE IS REQUIRED BY THE PRIVACY ACT OF 1974, P.L. 93-579, DECEMBER 31, 1974, 5 U.S.C. 552a(e)(3), AND THE PAPERWORK REDUCTION ACT OF 1980, P.L. 96-511, DECEMBER 11, 1980, 44 U.S.C. 3507.

SECTION III - LICENSE APPLICATION ENGINEERING DATA

Name of Applicant: Rochelle Broadcasting Company, Inc.

PURPOSE OF AUTHORIZATION APPLIED FOR: (check one)

☐ Station License ☑ Direct Measurement of Power

1. Facilities authorized in construction permit					
Call Sign	File No. of Construction Permit (if applicable)	Frequency (kHz)	Hours of Operation	Power in kilowatts	
				Night	Day
WRHL	n/a	1060	Unlimited	0.05	0.25

2. Station location	
State	City or Town
Illinois	Rochelle

3. Transmitter location			
State	County	City or Town	Street address (or other identification)
IL	Ogle	Rochelle	east end of 4th Ave.

4. Main studio location			
State	County	City or Town	Street address (or other identification)
IL	Ogle	Rochelle	400 May Mart Dr

5. Remote control point location (specify only if authorized directional antenna)			
State	County	City or Town	Street address (or other identification)
IL	Ogle	Rochelle	400 May Mart Dr

6. Has type-approved stereo generating equipment been installed? ☐ Yes ☑ No

7. Does the sampling system meet the requirements of 47 C.F.R. Section 73.68? ☑ Yes ☐ No ☐ Not Applicable

Attach as an Exhibit a detailed description of the sampling system as installed. Exhibit No. EE

8. Operating constants:

RF common point or antenna current (in amperes) without modulation for night system	RF common point or antenna current (in amperes) without modulation for day system
1.04	2.32

Measured antenna or common point resistance (in ohms) at operating frequency		Measured antenna or common point reactance (in ohms) at operating frequency	
Night	Day	Night	Day
50	50	-j21.2	-j21.2

Antenna indications for directional operation

Towers	Antenna monitor Phase reading(s) in degrees		Antenna monitor sample current ratio(s)		Antenna base currents	
	Night	Day & CH	Night	Day & CH	Night	Day
1(W) ASRN 1009547	-102.6°	-102.6°	0.562	0.562		
2(C) ASRN 1009546	0°	0°	1.000	1.000		
3(E) ASRN 1009548	+104.2°	+104.2°	0.443	0.443		

Manufacturer and type of antenna monitor: Potomac Instruments AM-19 (204) s/n1263

SECTION III - Page 2

9. Description of antenna system ((f directional antenna is used, the information requested below should be given for each element of the array. Use separate sheets if necessary.)

Type Radiator	Overall height in meters of radiator above base insulator, or above base, if grounded.	Overall height in meters above ground (without obstruction lighting)	Overall height in meters above ground (include obstruction lighting)	If antenna is either top loaded or sectionalized, describe fully in an Exhibit.
Vertical steel uniform cross section guyed insulated tower	67.6	1: 68.6, 2: 68.6, 3: 68.9	1: 68.6, 2: 69.2, 3: 68.9	Exhibit No. n/a

Excitation ☑ Series ☐ Shunt This is a Method of Moments Proof

Geographic coordinates to nearest second. For directional antenna give coordinates of center of array. For single vertical radiator give tower location.

North Latitude	41 °	55 '	24 "	West Longitude	89 °	03 '	30 "

If not fully described above, attach as an Exhibit further details and dimensions including any other antenna mounted on tower and associated isolation circuits. Exhibit No. EE

Also, if necessary for a complete description, attach as an Exhibit a sketch of the details and dimensions of ground system. Exhibit No. EE

10. In what respect, if any, does the apparatus constructed differ from that described in the application for construction permit or in the permit? n/a

11. Give reasons for the change in antenna or common point resistance.

No change. W228DT construction permit condition #2 requires this filing.

I certify that I represent the applicant in the capacity indicated below and that I have examined the foregoing statement of technical information and that it is true to the best of my knowledge and belief.

Name (Please Print or Type)	Signature (check appropriate box below)
Mark A. Mueller	Mark A. Mueller
Address (include ZIP Code) Mueller Broadcast Design 613 S. La Grange Rd. La Grange, IL 60525	Date November 25, 2019 Telephone No. (Include Area Code) (708) 352-2166

mark@muellerbroadcastdesign.com

☐ Technical Director ☐ Registered Professional Engineer

☐ Chief Operator ☑ Technical Consultant

☐ Other (specify)

Mueller Broadcast Design
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La Grange, Illinois 60525
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WRHL, ROCHELLE, ILLINOIS DIRECTIONAL ANTENNA PROOF OF PERFORMANCE NOVEMBER 2019

Exhibit EE ENGINEERING EXHIBIT TABLE OF CONTENTS

Mueller Broadcast Design
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State of Illinois)
)ss
County of Cook)

Mark Alan Mueller, first being duly sworn, deposes and says that he is a Broadcast Technical Consultant and owner of Mueller Broadcast Design, which has been retained by Rochelle Broadcasting Company, Inc., licensee of WRHL (AM), Rochelle, Illinois to prepare the following engineering exhibit. He is a licensed first-class radiotelephone operator, license number P1-18-44514 (renewed: PG-18-21512) and has been engaged in radio broadcast engineering work for a period of over 43 years. During this time he has been responsible for the preparation of many engineering exhibits and reports for submission to the Federal Communications Commission. He was awarded the Bachelor of Science degree from the University of Illinois at Urbana-Champaign.

The following exhibits were prepared by him and they are true and correct to the best of his knowledge and belief.

November 25, 2019

Mark A. Mueller, Affiant

Mueller Broadcast Design
613 S. La Grange Road
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Engineering Report For
Rochelle Broadcasting Company, Inc.
W R H L (A M)
Rochelle, Illinois
November 2019

This engineering report documents the Directional Antenna Performance Verification measurements for WRHL (AM), FCC facility ID number 57268, Rochelle, Illinois. WRHL operates on 1060 KHz with 250 watts and a three tower directional antenna daytime and 50 watts using the same daytime towers and pattern at night. This Verification is for the purpose of relicensing the WRHL patterns under Method of Moments and documents the required "model proof" to update the original 1966 license filing data. This also covers the installation of the antenna and transmission line for FM translator station W228DT, FCC Facility ID number 200245 which is located on the center (#2) tower. WYOT (FM), FCC Facility ID number 57269 is co-located on the west (#1) tower. All measurements were made personally by the writer in accordance with the FCC rules at 47 CFR 73.151(c). No changes were made to the licensed patterns.

Eligibility for 73.151(c) Processing

The WRHL antenna system consists of three conventional insulated uniform cross-section triangular 14" face series-fed steel guyed towers each 67.6 meters tall, 86° at the WRHL frequency of 1060 KHz. No changes were made in the tower configuration. They are sampled at the base using Delta TCT-3 toroidal current transformers. The ground system is of standard design, consisting of 120 equally-spaced buried bare copper wire radials around each tower 70.8 meters long (90°) except for those which intersect where three-inch copper straps terminate the radial intersections. A 3" strap interconnects the towers to each other and to the phasor and transmitter. No physical changes were made to the previously licensed towers or ground system.

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Measurements

The WRHL antenna system was modeled using Westberg Consulting's Phasor Professional 2.1.1 which calculates the tower matrix values as well as the proper operating parameters. The towers and sample lines were measured and documented using an Array Solutions PowerAIM-120 network analyzer serial number 1019 operated in accordance with the manufacturer's instructions. This analyzer exhibits excellent stability and field performance and since it operates "floating" via battery power and a Bluetooth radio connection to the associated computer no RF ground loop issues arise.

The three WRHL towers are identical in height and are base sampled using toroidal current transformers which are located at the output of the matching network on the lead to the tower. Each tower was disconnected at the sample transformer location and was measured at that point. The other towers were individually left floating for each measurement as required, plus additional measurements with the subject tower base insulator shorted to measure the feedline impedance with the ATU network disconnected. The only other component in circuit for these measurements was a static drain choke to ground which measures more than +j3,000 ohms at 1060 KHz, more than 60 times the highest base Z. These measurements are documented below and show excellent agreement with the Westberg theoretical numbers.

Prior to tuning the array, the Potomac Instruments AM-19(204) antenna monitor was calibrated and proper operation was verified following reinstallation using the built-in functions.

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MODEL DATA:

Tower Data:

WRHL TOWER INFORMATION						
	Tower Height (°)	Spacing (°)	Orientation	Face Width (in.)	Radius (in.)	Velocity Factor
Tower 1	86.0000	0.0000	0.0000	14.0000 / 14.0000	6.4663 / 6.4663	0.890000
Tower 2	86.0000	90.0000	80.0000	14.0000 / 14.0000	6.4663 / 6.4663	0.910000
Tower 3	86.0000	180.0000	80.0000	14.0000 / 14.0000	6.4663 / 6.4663	0.917000

Measured Impedance Matrix [47 CFR 73.151(c)(1)]

WRHL MATRIX INFORMATION Other Towers Open		
	Impedance (calculated)	Impedance (measured)
Tower 1	51.55 + j59.78	50.79 +j61.52
Tower 2	45.27 + j46.23	45.74 +j45.72
Tower 3	46.36 + j42.58	43.78 +j44.38

Measured data includes reactance of connection from the TCT location to the tower.

The Westberg Phasor Professional method-of-moments model fully complies with all FCC requirements for tower radius, height, segment length, and calculation reference points. No shunt capacitance was used. Towers were adjusted by varying the propagation velocity as shown above. The corrected measured impedances agree with the model within +/- 2 ohms and +/- 4%. Westberg's Phasor Professional uses a single wire of the desired effective radius divided into segments or no more than 10° electrical length each to model the tower.

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DETUNED TOWER CURRENTS from Westberg Phasor Professional

DETUNED TOWER CURRENTS
Tower 1
0.000000 > 0.000000 - 86.00° above ground
0.022241 > -125.138026 - 76.44° above ground
0.034318 > -125.664512 - 66.89° above ground
0.038640 > -126.269552 - 57.33° above ground
0.034970 > -127.023480 - 47.78° above ground
0.023033 > -128.303194 - 38.22° above ground
0.002702 > -145.304687 - 28.67° above ground
0.026748 > 54.770903 - 19.11° above ground
0.065656 > 53.282428 - 9.56° above ground
0.126698 > 52.527963 - -0.00° above ground
Tower 2
0.000000 > 0.000000 - 86.00° above ground
0.021542 > -125.813429 - 76.44° above ground
0.033174 > -126.308993 - 66.89° above ground
0.037298 > -126.868114 - 57.33° above ground
0.033713 > -127.556862 - 47.78° above ground
0.022172 > -128.720307 - 38.22° above ground
0.002546 > -144.484659 - 28.67° above ground
0.025812 > 54.075994 - 19.11° above ground
0.063325 > 52.731118 - 9.56° above ground
0.122369 > 52.050561 - -0.00° above ground
Tower 3
0.000000 > 0.000000 - 86.00° above ground
0.014685 > 148.800382 - 76.44° above ground
0.022407 > 149.434312 - 66.89° above ground
0.024951 > 150.089722 - 57.33° above ground
0.022294 > 150.869590 - 47.78° above ground
0.014383 > 152.204463 - 38.22° above ground
0.001276 > 176.615834 - 28.67° above ground
0.017531 > -30.961117 - 19.11° above ground
0.042088 > -29.492936 - 9.56° above ground
0.080478 > -28.724864 - -0.00° above ground

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MATRIX CALCULATIONS from Westberg Phasor Professional

ZMatrix		
51.55 + j59.78	24.46 - j22.03	-13.32 - j18.90
24.46 - j22.03	45.27 + j46.23	23.32 - j20.67
-13.32 - j18.90	23.32 - j20.67	46.36 + j42.58

YMatrix		
0.006871 - j0.007961	0.004120 + j0.004090	0.000865 - j0.000499
0.004120 + j0.004090	0.006071 - j0.007072	0.004335 + j0.005139
0.000865 - j0.000499	0.004335 + j0.005139	0.009299 - j0.008984

HMatrix - [I] = [H] X [F]		
0.018256 + j0.001552	0.000559 + j0.000862	0.000627 - j0.000278
0.000540 + j0.000829	0.019065 + j0.001501	0.000542 + j0.000832
0.000595 - j0.000263	0.000536 + j0.000821	0.019349 + j0.001482

HMatrix-Inverse - [F] = $[H]^{-1}$ X [I]		
54.386555 - j4.538662	-1.870693 - j2.140700	-1.644889 + j1.195184
-1.805813 - j2.057311	52.073414 - j3.830178	-1.685828 - j1.962171
-1.560888 + j1.132386	-1.665658 - j1.935893	51.384785 - j3.870040

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TOWER OPERATING CURRENTS from Westberg Phasor Professional

Tower 1
0.000000 > 0.000000 - 86.00° above ground
0.331939 > -10.967764 - 76.44° above ground
0.596352 > -10.367197 - 66.89° above ground
0.822709 > -9.702744 - 57.33° above ground
1.007639 > -8.938773 - 47.78° above ground
1.146609 > -8.033844 - 38.22° above ground
1.235250 > -6.925819 - 28.67° above ground
1.269756 > -5.508504 - 19.11° above ground
1.246514 > -3.576530 - 9.56° above ground
1.139700 > 0.000000 - -0.00° above ground
Tower 2
0.000000 > 0.000000 - 86.00° above ground
0.474913 > 96.500689 - 76.44° above ground
0.863788 > 96.940137 - 66.89° above ground
1.208714 > 97.405518 - 57.33° above ground
1.505101 > 97.914717 - 47.78° above ground
1.746464 > 98.485922 - 38.22° above ground
1.926326 > 99.145125 - 28.67° above ground
2.039007 > 99.934728 - 19.11° above ground
2.079602 > 100.931564 - 9.56° above ground
2.029290 > 102.588893 - -0.00° above ground
Tower 3
0.000000 > 0.000000 - 86.00° above ground
0.191446 > -156.526760 - 76.44° above ground
0.350709 > -156.167027 - 66.89° above ground
0.494559 > -155.817534 - 57.33° above ground
0.621081 > -155.470493 - 47.78° above ground
0.727558 > -155.120001 - 38.22° above ground
0.811253 > -154.757224 - 28.67° above ground
0.869778 > -154.367252 - 19.11° above ground
0.901216 > -153.923106 - 9.56° above ground
0.901881 > -153.255903 - -0.00° above ground

TOWER DRIVE INFORMATION – DAY

	Field Ratios	Field Phase	Drive Imped. (Ω)	Current	Monitor*	Power (W)
Tower 1-W	1.0000	0.0000	83.01 + j128.94	1.14 ∠ 0.00	**0.562 ∠ -102.6°**	107.8208
Tower 2-C	1.5300	106.0000	36.58 + j47.82	2.03 ∠ 102.59	**1.000 ∠ 0°**	150.6325
Tower 3-E	0.6400	-148.0000	14.20 + j16.83	0.90 ∠ -153.26	**0.443 ∠ +104.2°**	11.5467

Note: The same parameters are used day and night.

*** = These are the pattern parameters used to tune the array and are on the Form 302.**

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Sample System Verification [47 CFR 73.151(c)(2)]

Sample Lines: Andrew 3/8" LDF2-50J Foam Dielectric Heliax

85% velocity factor, 50 ohms +/- 1 ohm

Sample Element Type: Delta TCT-3 Toroidal Current Transformers, 1 volt per amp into a 50 ohm load

Location: At output of antenna tuning network on tower feedline

Operating Potential: Grounded

Antenna Monitor: Potomac Instruments AM-19(204), s/n 1263

TCT Phase and Ratio Test (Tower 2 is reference) and Impedances at 1060 KHz:

Tower 1 (s/n 214):	1.000/+0.2°	49.664 +j1.289 ohms
Tower 2 (s/n 220):	1.000/ 0°	49.639 +j1.605 ohms
Tower 3 (s/n 298):	0.997/ 0.0°	49.934 +j1.804 ohms

The phase and ratio calibration test was done with all transformers removed from the ACUs and configured adjacent to each other reading 1 amp of RF current into a 50 ohm dummy load. The cables used to connect the TCTs to the monitor are identical in electrical length and characteristic impedance, and are maintained by the writer for these tests.

Sample Impedance From Monitor End at 1060 KHz with TCTs connected:

Tower 1 (W) Sample Impedance:	52.654 -j1.170 ohms
Tower 2 (C) Sample Impedance:	52.895 -j0.438 ohms
Tower 3 (E) Sample Impedance:	53.271 -j2.233 ohms

Sample lines and elements were measured with the PowerAIM-120 Network Analyzer. All lines and sample elements agree within 2 ohms. The maximum variation between sample elements is 0.3% and 0.2°. The maximum variation in sample line length is 0.3°

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WRHL Sample Line Length and Impedance Test:

Tower 1							
Marker	Freq (MHz)	Rs	Xs	Zmag	Z (ohms)	Length°	Error°
F-45°	0.986189	4.962	-50.214	50.459			
Fc	1.060000	3.553	-26.938	27.171		**241.84**	**0**
F@270°	1.183427	3.112	0.000	3.112		270	
F+45°	1.380665	7.239	49.365	49.893	**50.175**		

Tower 2							
Marker	Freq (MHz)	Rs	Xs	Zmag	Z (ohms)	Length°	Error°
F-45°	0.985424	5.184	-50.613	50.878			
Fc	1.060000	3.478	-26.788	27.013		**242.028**	**-0.188**
F@270°	1.182509	3.178	0.000	3.178		270	
F+45°	1.379594	7.186	49.851	50.366	**50.621**		

Tower 3							
Marker	Freq (MHz)	Rs	Xs	Zmag	Z (ohms)	Length°	Error°
F-45°	0.986646	5.145	-50.191	50.454			
Fc	1.060000	3.464	-27.028	27.249		**241.728**	**0.112**
F@270°	1.183975	3.240	0.000	3.240		270	
F+45°	1.381304	7.280	49.350	49.884	**50.168**		

The maximum phase error is **0.3°** and the maximum impedance difference is **0.453 ohms**, well within the allowed limits.

Sample lines and elements were measured with the PowerAIM-120 Network Analyzer.

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WRHL Daytime Reference Field Strength Measurements

[47 CFR 73.151(c)(3)]

Point	Distance	mV/m	Coordinates (NAD 84)	Description
32° True (Minima)				
1	3.58	8.90	41.9500865, -89.0347195	Dement Rd.
2	6.08	3.75	41.9746536, -89.0141416	100' east of 17202 Lind Rd.
3	8.92	2.40	41.9907915, -89.0005804	Mulford Rd. 200' north of creek
65° True (Minima)				
1	5.24	1.20	41.9426536, -89.0003229	5543 Mulford Rd.
2	7.05	1.30	41.9495419, -88.9805389	Towmbly Rd. 50' east of Chamberlain Rd.
3	8.89	0.90	41.9564934, -88.9604545	Woodlawn at north end of guardrail
95° True (Minima)				
1	3.44	3.30	41.9200934, -89.0163303	200' west of 17234 Creston Rd.
2	4.79	4.00	41.9189556, -89.0001083	Mulford Rd. 200' south of Creston Rd.
3	6.41	2.35	41.9176735, -88.9806676	Locust Rd.
128° True (Minima)				
1	5.97	2.70	41.8895891, -89.0009237	Paw Paw Rd.
2	6.93	1.90	41.8842818, -88.9918256	Hayes Rd.
3	8.04	1.25	41.8781241, -88.9812899	Locust Rd. 100' north of phone pedestal
260° True (Maxima)				
1	1.24	198	41.9207785, -89.0723992	209 10th St.
2	1.45	178	41.9204620, -89.0748078	201 12th St.
3	1.76	140	41.9199692, -89.0784824	15th St. across from NB stop sign

WRHL operates with 50 watts at night using the same directional antenna parameters so a separate nighttime table is not included.

All readings taken November 24, 2019 by Mark A. Mueller using his FIM-41, s/n 1655 last calibrated 7/16/2017.

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Tower Survey [47 CFR 73.151(c)(1)(ix)]

This application coverts the WRHL license from a standard measured radial proof to Method of Moments with no other changes to the licensed directional patterns. Therefore, per §73.151(c)(1)(ix) no tower survey is required.

Preparer's Certification

This engineering report was prepared by me from data personally collected on site using equipment owned and maintained by me for this purpose. It is true and correct to the best of my knowledge and belief. The WRHL antenna system is properly adjusted as documented herein and it is requested that the WRHL license be modified to specify the operating parameters shown on the associated FCC form 302-AM.

November 25, 2019

Mark A. Mueller